

## Claims

1. A sliding opening and closing device, comprising:

A main plate;

5 A slide plate, which is linked to said main plate to be slidable in one direction;

An elastic part which is supported by said main plate and generates an elasticity power in one direction; and

A power transformation member which receives the elasticity power of said elastic member, so that on a particular position in the moving path of said slide plate, it can apply the elasticity power to said slide plate in the direction to be closed when said slide plate is in the closing position, and apply the elasticity power to said slide plate in the direction to be opened when said slide plate is in the opening position.

10 2. The sliding opening and closing device as claimed in claim 1, wherein at least

15 one set of guide slits are formed on said slide plate along the moving direction, and guide ribs, which are linked to be slidable to each of said guide slits, are formed on said main plate.

20 3. The sliding opening and closing device as claimed in claim 1, wherein one end of said elastic part is supported by said main plate, the other end of said elastic part is supported by said power transformation member, and said elastic part is a torsion spring generating a widening elastic force.

25 4. The sliding opening and closing device as claimed in claim 1, wherein one end of said power transformation member is linked to said elastic part and is guided on said main plate so that it can move only in the orthogonal direction toward the moving direction of said slide plate, and the other end of said power transformation member

comprises a pivoting arm which is linked to said slide plate so as to be able to be pivoted.

5. The sliding opening and closing device as claimed in claim 1, wherein said power transformation member comprises moving blocks which are fixed to receive the elasticity power of said elastic member, and

Said slide plate forms a cam groove comprising a first slope having an angle applying power to said slide plate in the direction to be opened by receiving the elasticity power of said moving blocks and a second slope which is linked to said first slope and has an angle applying power to said slide plate in the direction to be closed.

10 6. The sliding opening and closing device as claimed in claim 5, wherein said moving blocks comprise:

A cam pivot, which is linked to said elastic part, has a projection, which is linked to be slidable to said cam groove;

15 A bushing which is linked to be slidable to a long hole which is formed in the direction where the elasticity power of said elastic part is applied to said main plate; and

A screw, which penetrates, said bushing and connects to said cam pivot.

7. The sliding opening and closing device as claimed in claim 1, wherein a guide member is additionally comprised of, which guides the connection part of said elastic part and said power transformation member to move along the direction where the elasticity power of said elastic part is applied to, and generates damping force to said power transformation member by allowing said slide plate not to move in the direction to be closed in the state that said slide plate is closed into said main plate and allowing said slide plate not to move in the direction to be opened in the state that said slide plate is opened from said main plate.

25 8. The sliding opening and closing device as claimed in claim 7, wherein said

guide member comprises a guide pin connecting said elastic part and said power transformation member, and a long hole is formed on said slide plate for guiding said guide pin to move in an orthogonal direction toward the moving direction of said slide plate.

5        9. The sliding opening and closing device as claimed in claim 1, wherein said power transformation member comprises a link wherein a first end, to which said elastic part is fixed, is connected to said slide plate to enable pivot rotation therearound, and a second end is connected so that said elastic part can move straightly as much as the predetermined distance and pivoting around the position where said elastic part is connected to said main plate.

10        10. The sliding opening and closing device as claimed in claim 9, wherein said power transformation member comprises a link wherein a first pivot hole, which is connected to a first rotation pivot projecting from said slide plate, is formed on a first end, and a long hole, which provides space to a second rotation pivot projecting from said main plate to move, is formed on a second end.

15        11. The sliding opening and closing device as claimed in claim 10, wherein said opening and closing device limits the moving distance of said slide plate by making the end of said long hole to be hooked to said second rotation pivot in the position where said plate is opened and closed toward said main plate.

20        12. The sliding opening and closing device as claimed in claim 11, wherein a second boss is formed on said slide plate and a locking portion is formed on said link, which limits the rotation of said link by being hooked by said second boss before said slide plate moves to the position where said main plate is completely closed, thereby making the moving distance of the direction where said slide plate is closed to be 25 shorter than the moving direction where said slide plate is opened.

13. The sliding opening and closing device of a cellular phone as claimed in claim 10, comprising said elastic part wherein one end is fixed between said first axis hole and said long hole, the other end is linked to said second rotation pivot to be rotated, and has a torsion spring generating an elasticity power in the widening direction.

14. The sliding opening and closing device as claimed in claim 9, wherein said power transformation member comprises a first block wherein a second pivot hole is formed, which is connected to be rotated around a third rotation pivot projecting from said slide plate;

10 At least one sealed part fixed to said first block; and

A second block wherein a penetrating hole, to which said sealed part is connected to be slidable, is formed, and a third pivot hole, which is connected to said second boss formed on said slide plate to be rotatable, is formed.

15 15. The sliding opening and closing device as claimed in claim 14, characterized by limiting the moving distance of said slide plate by fixing a bridging piece at the sealed part penetrating said penetrating hole and making said bridging piece to be hooked by said second block at the position where said slide plate is closed and opened.

20 16. The sliding opening and closing device as claimed in claim 14, characterized by forming said first block as a non-circle and a bridging projection for limiting the rotation of said first block on said slide plate before said slide plate moves to the position where said slide plate is completely closed toward said main plate, thereby making the moving distance in the direction where said slide plate is closed to be shorter than the moving distance in the direction where said slide plate is opened.

25 17. The sliding opening and closing device as claimed in claim 14,

characterized in that said elastic part is connected to said sealed part and comprises a compression spring generating an elasticity power in the direction where said first block and said second block move away from each other.

18. The sliding opening and closing device as claimed in claim 1,  
5 characterized in that the power transformation member comprises a first block which is linked to be rotatable to a first spot of said main plate; a second block which is linked to be rotatable to a second spot of said slide plate which has a different moving path from said first spot; and a bar member which connects the first block with the second block elastically, wherein said elastic part is coupled to said bar member and generates an elasticity power in a direction of extending said first block and said second block.

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15 19. The sliding opening and closing device as claimed in claim 18,  
characterized in that based on the point of inflection in the moving course of the slide plate, at a closed position of said slide plate, said second block is positioned in a direction of closing into said first block, so that the elasticity power of said elastic part can affect in a direction of closing said slide plate; while at an open position of said slide plate, said second block is positioned in a direction of opening from said first block, so that the elasticity power of said elastic part can affect in a direction of closing said slide plate.

20. The sliding opening and closing device as claimed in claim 18,  
characterized in that said second block is installed at the place where the moving distance of said slide plate when being opened can be shorter than the moving distance of said slide plate when being closed.

25 21. The sliding opening and closing device as claimed in claim 18,  
characterized in that a female shaft which is fixed to one side of said first block or said second block, and the length of which is shorter than the beeline between said first

block and said second block; and a male shaft which is fixed to the other side of said first block or said second block, and the length of which is shorter than the beeline between said first block and said second block is slidable in said female shaft during the opening and the closing of said slide plate.

5 22. The sliding opening and closing device as claimed in claim 18, characterized in that said elastic part is composed of a compression spring.

10 23. The sliding opening and closing device as claimed in claim 1, characterized in that said elastic part generates a tension, and said power transformation member is composed of at least two link rows, which connect a first spot of said main plate to a second spot of said slide plate, each of which is composed of at least two links having one or more refraction points, and which receive the tension of said elastic part and generate an elasticity power in a direction of extending said first and said second spots.

15 24. The sliding opening and closing device as claimed in claim 23, characterized in that said elastic part is composed of a tension spring.

20 25. The sliding opening and closing device as claimed in claim 23, characterized in that said power transformation member supplies an elasticity power in a direction of closing said slide plate at a closed position of said slide plate based on the inflection point, while it supplies the elasticity power in a direction of opening said slide plate at an open position of said slide plate based on the inflection point.

26. The sliding opening and closing device as claimed in claim 23, characterized in that said power transformation member controls the moving distance in the direction of opening said slide plate to be shorter than the moving distance in the direction of closing said slide plate.

25 27. The sliding opening and closing device as claimed in claim 1,

characterized by additionally comprising a compensation elastic means which generates an elasticity power in the same direction as said elastic part as to the direction of moving said slide plate, while generates an elasticity power in a symmetrical direction to the elasticity power of said elastic part as to the perpendicular direction of moving said slide plate, so that said slide plate can receive a uniform force as to the perpendicular direction.

28. The sliding opening and closing device as claimed in claim 27, characterized in that said compensation elastic means comprises a first block which is connected to be rotatable to the first spot of said main plate; a second block which is connected to be rotatable to the second spot of said slide plate; a guide shaft which connects said first block to be elastic to said second block; and an elastic part which is coupled to said guide shaft, and generates an elasticity power in a direction of extending said first and said second blocks.

29. The sliding opening and closing device of a portable terminal as claimed in claim 28, characterized in that based on the point of inflection in the moving course of said slide plate, at a closed position of said slide plate, said second block is positioned in a direction of closing into said first block, so that the elasticity power of said elastic part can affect in a direction of closing said slide plate; while at an open position of said slide plate, said second block is positioned in a direction of opening from said first block, so that the elasticity power of said elastic part can affect in a direction of closing said slide plate.

30. The sliding opening and closing device of a portable terminal as claimed in claim 28, characterized in that said second block is installed at the place where the moving distance of said slide plate when being opened can be shorter than the moving distance of said slide plate when being closed.

31. The sliding opening and closing device of a portable terminal as claimed in claim 28, characterized in that said guide shaft comprises a female shaft which is fixed to one side of said first block or said second block, and the length of which is shorter than the beeline between said first block and said second block; and a male shaft which is fixed the other side of the first block or the second block, and the length of which is shorter than the beeline between said first block and said second block and is 5 slidable in said female shaft during the opening and the closing of said slide plate.

32. The sliding opening and closing device as claimed in claim 28, characterized in that said elastic part is composed of a compression spring.

10 33. The portable terminal having the sliding opening and closing device, characterized by comprising a main body; a sub body which is connected to be slidable to said main body; a stoppering part for fixing said sub body to either position between said sub body being inputted into said main body and being outputted from said main body; and an elasticity part which supplies an elasticity power in a direction where said 15 sub body is outputted from said main body or inputted into said main body.

34. The portable terminal having the sliding opening and closing device as claimed in claim 33, characterized in that a keypad is placed on said main body, and a liquid crystal screen is placed on said sub body.

20 35. The portable terminal having the sliding opening and closing device as claimed in claim 33, characterized by comprising a receipts space is formed from the side direction to the inside of said main body, to which said sub body comes in and out said receipts space.

25 36. The portable terminal having the sliding opening and closing device, characterized in that said stoppering part comprises a sliding bar in which a hook hanging in a fitting boss installed in said sub body and a first elongated hole in a sliding

direction are formed, and one end of which comes in and out from the inside of said main body to the outside thereof; a first pin which is installed in said main body and coupled to said first elongated hole; and a compression spring flipping said sliding bar in a direction where said hook is hung in said fitting boss.

5        37. The portable terminal having the sliding opening and closing device as claimed in claim 33, characterized in that said elastic part comprises a first cross bar, one end of which is supported by said main body, and the other end of which is supported by said sub body; a second cross bar which is positioned to be crossed with said first cross bar, one end of which is supported by said main body, and the other end 10 of which is supported by said sub body; a second pin which is coupled to the centers of said first and said second cross bars, and which makes said first and said second cross bars to be rotated relatively; and a torsion spring which is coupled to said second pin, and which supplies an elasticity power in a direction where said first and said second cross bars push said sub body.

15        38. The portable terminal having the sliding opening and closing device as claimed in claim 37, characterized by comprising at least two elastic parts in serial.

20        39. The portable terminal having the sliding opening and closing device as claimed in claim 37, characterized in that said elastic parts additionally comprise a first bracket, which is coupled to one ends of said first and said second cross bars, and which is fixed to said main body; a second bracket, which is coupled to the other ends of said first and said second cross bars, and which is fixed to said sub body; and a pair of guide rails, which are respectively fixed to both sides in said main body and which form a guide groove to which both ends of said first and said second brackets are coupled to be slidable.

25        40. The portable terminal having the sliding opening and closing device,

characterized by comprising a main body; a main plate which is coupled to said main body; a slide plate which is coupled to be slidable to said main plate; a rotating plate which is coupled to be rotatable to said slide plate; a sub body which is fixed to said slide plate; and a display device which is fixed to said rotating plate and rotates on said sub body.

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41. The portable terminal having the sliding opening and closing device as claimed in claim 40, characterized in that a slide shaft is fixed to said slide plate, and a shaft holder is installed in said main plate, which is coupled to be slidable to said slide shaft.

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42. The portable terminal having the sliding opening and closing device as claimed in claim 40, characterized by comprising a first elastic part which supplies an elasticity power in a direction of closing said slide plate when said slide plate is near to the closed position of said slide plate based on a certain spot on the moving course of said slide plate, while it supplies an elasticity power in a direction of opening said slide plate when said slide plate is near to the open position of said slide plate based on a certain spot on the moving course of said slide plate.

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43. The portable terminal having the sliding opening and closing device as claimed in claim 42, characterized in that the point of inflection in a direction of supplying force of said first elastic part is positioned within 1/2 of the total movement distance of said main plate from the closed spot thereof.

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44. The portable terminal having the sliding opening and closing device as claimed in claim 42, characterized in that said first elastic part is composed of a torsion spring, one end of which is supported by said main plate and the other end of which is supported by said slide plate.

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45. The portable terminal having the sliding opening and closing device as

claimed in claim 42, characterized in that said first elastic part is composed of a torsion spring, one end of which is supported by said main plate and the other end of which is supported by said rotating plate, so that it can supply an elasticity power to said rotating plate to maintain the initial condition when said rotating plate is not rotating, while it can supply an elasticity power to said rotating plate to continue to rotate when said rotating plate is rotating.

46. The portable terminal having the sliding opening and closing device as claimed in claim 44 or 45, characterized in that the winding part of said first elastic part is wound a plurality of times, so that its radius can become widened around a concentric circle.

47. The portable terminal having the sliding opening and closing device as claimed in claim 40, characterized by additionally comprising a second elastic part which supplies an elasticity power to said rotating plate to maintain the initial condition when said rotating plate is not rotating, while it supplies an elasticity power to said rotating plate to continue to rotate when said rotating plate is rotating.

48. The portable terminal having the sliding opening and closing device as claimed in claim 47, characterized in that said second elastic part is composed of a torsion spring, one end of which is supported by said slide plate and the other end of which is supported by said rotating plate.

20 49. The portable terminal having the sliding opening and closing device as claimed in claim 48, characterized in that the winding part of said second elastic part is wound a plurality of times, so that its radius can become widened around a concentric circle.

1/ 50. The slidable and rotatable communication terminal as claimed in claim 25 40, characterized in that said rotating plate rotates around the center axis which passes

through the penetrating hole formed at the center of said rotating plate, and which is coupled to said slide plate.

51. The portable terminal having the sliding opening and closing device as claimed in claim 50, characterized in that at said slide plate, a table part is formed to support the bottom of the center area of said rotating plate.

52. The portable terminal having the sliding opening and closing device as claimed in claim 40, characterized by additionally comprising a rotation limiting means for limiting the rotation angle of said rotating plate.

10 53. The portable terminal having the sliding opening and closing device as claimed in claim 52, characterized in that said rotation limiting means is composed of a rotation limiting boss which is formed at one side of said slide plate or said rotating plate, and which is inserted into a trajectory groove formed at the other side thereof, wherein said rotation limiting boss contacts both ends of said trajectory groove and controls said rotating plate not to rotate any more when it is rotating or is not rotating.